



GENERATION



DELIVERY & STORAGE



ENERGY USE

THE FUTURE OF ENERGY

Mitigating and adapting to climate change, as well as addressing threats to energy infrastructure, require urgent action. At Sandia National Laboratories, we're using our expertise to accelerate the transition to secure, resilient, and sustainable energy.

ENERGY SECURITY FOR THE NATION

The nation's security and economy depend on an abundant, affordable energy supply, as well as energy systems that are resilient to threats and geopolitical instability. Moving toward carbon-free options in electric generation, transportation, and manufacturing also provides an opportunity to increase the nation's energy security.

Sandia National Laboratories deploys core competencies, specialized facilities, and multidisciplinary research teams to address energy-related challenges that fall beyond the capabilities of industry or universities. Sandia has conducted energy research since 1971 for the nation; the budget for Sandia's energy portfolio is more than \$200 million annually. As a long-term strategic partner to the federal government, we operate in the public interest with objectivity and independence.

LEVERAGING OUR NATIONAL SECURITY CAPABILITIES

Sandia is the engineering arm of the U.S. nuclear weapons enterprise and one of the two largest federally funded research and development centers. The government's investments in Sandia have resulted in extensive capabilities that can be deployed for other national security challenges, such as those in energy. Sandia's expertise in materials science, computational modeling, physical security,

cybersecurity, safety, microelectronics, and subsurface technologies enables us to contribute to energy research as part of our exceptional service in the national interest. Sandia currently has a broad portfolio of energy research in generation, delivery, storage, and utilization.

CLEAN ENERGY GENERATION

A transition to sustainable electricity production is already well underway. For renewable energy, Sandia leverages decades of experience and specialized facilities to advance a wide variety of technologies: concentrating and photovoltaic solar power, as well as wind, geothermal, marine, and hydrokinetic energy. Sandia's work in renewable energy often bridges innovation and commercialization through specialized testing, modeling and analysis, and systems engineering.

Nuclear energy provides reliable baseload power without greenhouse gas emissions. We leverage our experience in safety, security, and modeling to secure and extend the life of the existing U.S. commercial nuclear power plant fleet and support next-generation advanced reactors. Sandia is a leader in severe accident modeling and analysis. We also understand the challenges that accompany nuclear waste—and lead the nation's R&D activities to provide the technical basis for safely storing, transporting, and disposing of nuclear waste and spent nuclear fuel.





ENERGY DELIVERY AND STORAGE

Producing clean energy is only part of the equation. To tackle climate change and increase energy security, the nation also needs better ways to deliver and store energy. One approach is the modernization of the electric grid. Sandia is leveraging our capabilities to increase the resilience of the grid and improve the integration of distributed renewable resources. Our efforts in grid modernization also include extensive work in energy storage. In fact, Sandia is the lead Department of Energy lab for grid storage research. We investigate materials for novel battery chemistries, conduct modeling to improve battery safety, and develop power electronics devices to better integrate storage into the nation's electric systems. Sandia is also piloting solar thermal-based energy storage.

Expanding the use of biofuels and hydrogen offers promising ways to decarbonize the nation's economy. Sandia deploys existing capabilities to characterize and model bioenergy. Our researchers also have a deep, quantitative understanding of how materials interact with hydrogen; this understanding forms the basis of our hydrogen storage and safety work.

While the nation is transitioning to net-zero emissions energy, the United States still relies heavily on fossil fuels. Sandia provides scientific and technical expertise to help maintain the nation's Strategic Petroleum Reserve—the world's largest supply of emergency crude oil.

ENERGY USE

The nation uses energy for transportation, to heat and light homes and businesses, and for industrial processes such as producing cement and steel. Using energy efficiently and switching to cleaner energy in all sectors can help the United States achieve its economic, climate, and energy security goals.

Sandia's efforts in energy use include work in sustainable transportation. We have been contributing to research on the efficiency and emissions profile of internal combustion engines for more than 40 years. Our work to accelerate the transition to electric vehicles includes research in electric drivetrain components, battery safety, and charging-infrastructure cybersecurity.

ACCELERATING THE TRANSITION TO SECURE, RESILIENT, AND SUSTAINABLE ENERGY

By leveraging our national security capabilities, Sandia is helping to advance the technologies that the nation relies on to generate, deliver, store, and use secure, resilient, and sustainable energy.

To learn more about Sandia's role in energy and our efforts to address climate change, visit energy.sandia.gov.



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